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April 12, 2022

Maureen Forlenza
ExxonMobil Environmental & Property Solutions Company
Bayway Refinery Complex
1400 Park Avenue, Building 7
Linden, NJ 07036

RE: Bayway Refinery Complex – IAOC A9 Remedial Action Report dated November 19, 2020
1400 Park Avenue
Linden, Union County
SRP PI #: 008282, Activity Number: RPC000002

Dear Ms. Maureen Forlenza:

The New Jersey Department of Environmental Protection (Department) has completed a review of the IAOC A9 Remedial Action Report (RAR) dated November 19, 2020, submitted pursuant to the Administrative Consent Order (ACO), the Site Remediation Reform Act (N.J.S.A.58:10C-1 et seq.), the Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C 7:26C), and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E.

The Department's comments on the submittal are provided below.

General Comments

1. The report references Appendix C for the soils data and figures, which is dated March 2012. Since these figures and tables were created, the standards have changed, and ExxonMobil indicated the use of the newer standards to demonstrate compliance with applicable remediation standards, but did not provide updated tables and figures reflecting this. This makes the Department's review difficult and time consuming. The Department requests updated tables and figures pursuant to N.J.A.C. 7:26E-1.6 and 5.7. To be clear, ExxonMobil must clearly indicate which standards are used for each COC, for each media, and exposure pathway where applicable. The Department reserves further comment once those tables and data have been received, if warranted.

2. The Department understands that much of IAOC A9 has been categorized by ExxonMobil as "Category 1 Active Operating Area" having active and dense infrastructure. There are many parts of the IAOC that have concentrations of EPH above the presumed default product limit of 17,000 mg/kg and the ceiling limit of 30,000 mg/kg and is considered free product. In situations like this, a claim for technical impracticability may allow the PRCR to defer removal or treatment of free product and residual product, or as the report refers to it as "immobile LNAPL" until refinery

operations cease. The report must be amended to include language addressing free product and residual product in accordance with pursuant to N.J.A.C. 7:26E-5.1(e) once operations cease.

3. Many sections of the report are contradictory with respect to the presence of LNAPL. Some portions say there is "no mobile LNAPL" then other sections indicate that LNAPL will be contained, or "the oil water separator will be used to separate the LNAPL from the collected ground water…". Clarification is needed on the whether LNAPL is or has historically been present.

4. Please explain why there are so many soil samples that were not analyzed, "NA", for several COCs for several locations throughout the IAOC.

5. On electronic page 25 of the IAOC A9 RAR, it states that "Post RAW analytical results also indicated that aluminum, manganese, iron, and sodium exceeded their respective NJDEP Class II-A GWRS. However, these metals are not considered COCs in ground water because they are naturally occurring or the result of salt/brackish water intrusion, and no additional investigation or remediation of these metals is necessary." Additional details should be provided for an argument that these contaminants are either naturally occurring or due to salt/brackish water intrusion. A natural background investigation should be performed in accordance with N.J.A.C. 7:26E-3.8 to support the above claim. A natural background investigation is performed by collecting and analyzing a sufficient number of samples in appropriate locations both horizontally and vertically, on or near the site, that have not been impacted by current or historical on-site or off-site activities to adequately determine that the concentration of the contaminant in ground water may be due to natural background.

6. The piezometer installation summary table on electronic page 42 of the IAOC A9 RAR provides information for piezometers which are identified as EPZ-116 through EPZ-123. The nomenclature used to identify these piezometers as having an "EPZ" prefix conflicts with other sections of the report, including other figures, tables, and appendices, which reference the piezometers as APZ-116 through APZ-123. The well records, permit and Form B's included in Appendix I (starting on e-page 277 of the IAOC A9 RAR) use the "APZ" prefix for all piezometers. It should be confirmed if the "EPZ" prefixes used in the summary table on electronic page 42 are typographical errors, or this matter should be clarified otherwise.

7. On electronic page 7 of the Construction Completion Report for IAOC A9 (CCR), it states that "The recovery wells were all stainless steel, 10 inches in diameter, and ranged in depth from 11 to 13 feet bgs. The well screen intervals ranged from top depth of 5 to 5.5 feet bgs, to a bottom depth of 7 to 9 feet bgs." However, Table 1 on electronic page 38 which provides the recovery well construction details, does not show any well screen intervals with a top depth of 5.5 feet bgs. Table 1 shows all well screen intervals with a top depth of 5 feet bgs, bottom depths ranging from 7.4 to 9.4 feet bgs, and total depth ranging from 11.4 to 13.4 feet bgs. The information presented in Table 1 matches the information presented in the Monitoring Well Records from Attachment 5 (beginning on

electronic page 2039), so the error appears to be in the written portion of the text, cited above, referencing a top depth of 5.5 feet bgs for the well screen intervals. Clarification is requested.

Specific Comments

1. *Figure 5, IAOC A9 Capping Map* displays the existing cover as cap for the northern portion of the IAOC, and the installed cap for the small western portion. The Department requests an updated figure to demonstrate where the soil exceedances are in relation to the engineering controls.

2. Section 6.4 *Capping System,* states: "It should be noted that caps A9-1, A9-2, A9-4, A9-5, and A9-6 were installed but based on the below information that was included in the Capping Requirement Reduction Memo, they are not included on Figure 5 (Capping Map)." Even though ExxonMobil claims these areas no longer require a cap, the Department requests that a figure be submitted demonstrating the extent of these areas for clarification.

3. Section 2 *Applicable Remediation Standards and Screening Criteria:* This section discusses the application of TPH and EPH data, and has identified Category 2 petroleum products as a COC for the IAOC. However, ExxonMobil has not identified what the actual EPH product(s) is or are. Category 2 has a default product limit of 17,000 mg/kg EPH, except for MGP, crude oil, cutting oil, and unknown petroleum products, for which the default product limit is 8,000 mg/kg. Other IAOCs of the BRC have had mixtures resulting in a default product limit of 8,000 mg/kg EPH. Clarification on which type of Category 2 EPH product(s) are present in this IAOC is needed.

4. Vertical delineation has not been demonstrated for many samples points, particularly noteworthy, GMW-124, GMW-135, and ASB-29, which all exceed the presumed default product limit of 17,000 mg/kg, the TPH remediation criterion of 10,000 mg/kg, and the current ceiling limit of 30,000 mg/kg EPH. Note the SRC calculator was not run for these samples.

   Sample GMW-120 is not delineated in the NW direction (which is out of the boundaries of IAOC A9) at a concentration of 35,300 mg/kg from 0-2 ft. This exceeds the presumed default product limit of 17,000 mg/kg, the TPH remediation criterion of 10,000 mg/kg, and the current ceiling limit of 30,000 mg/kg EPH. Note the SRC calculator was not run for this sample.

   Sample A9-BS-1 is not delineated to the east. Additionally, this sample point failed the nonresidential SRC calculator, exceeds the presumed default product limit of 17,000 mg/kg, the TPH remediation criterion of 10,000 mg/kg, and the current ceiling limit of 30,000 mg/kg EPH from 4-4.5 ft bgs. The sample taken from 6-6.5 ft bgs also fails the nonresidential SRC calculator, exceeds the presumed default product limit of 17,000 mg/kg, and the TPH remediation criterion of 10,000 mg/kg.

Delineation of free product and residual product, and all other COCs is required, pursuant to N.J.A.C. 7:26E-4.2.

Please note this is not a comprehensive list of sample points where additional delineation is required.

5. Per electronic page 51 of the IAOC A9 RAR, a Hydraulic Control Monitoring Program was developed to monitor and evaluate the performance of the ground water remedial action within IAOC A9. Multiple lines of evidence were evaluated to assess hydraulic control, one of which was comparing whether the water levels in piezometers near the barrier wall gaps were below the water levels in the adjacent surface water bodies. Electronic page 54 of the IAOC A9 RAR stated that "water level elevations in the piezometers were consistently below the adjacent surface water elevations in 4Q of 2019 and 1Q of 2020, with the exception of APZ-121 in 4Q of 2019." It continues "…Aside from the apparent anomaly in APZ-121 during 4Q of 2019, the water levels in the A9 area barrier wall gaps and the gaps between the A9 and GCT barrier walls were below adjacent surface water elevations in 4Q of 2019 and 1Q of 2020. Based on these results, this hydraulic control criterion has been achieved."

   Figures 8 and 9 on electronic pages 76 and 77 of the IAOC A9 RAR are the groundwater contour maps for the November 2019 (4Q of 2019) and the March 2020 (1Q of 2020) sampling events, respectively. The November 2019 figure (Figure 8) shows that APZ-122 had an elevation of 5.00 ft msl and APZ-123 had an elevation of 5.96 ft msl, both exceeding the surface water elevation of the adjacent Morses Creek, which had an elevation of 4.38 ft msl. Similarly, the March 2020 figure (Figure 9) shows that APZ-122 had an elevation of 4.78 ft msl and APZ-123 had an elevation of 5.89 ft msl, both exceeding the surface water elevation of the adjacent Morses Creek, which had an elevation of 3.37 ft msl.

   Hydraulic control does not appear to have been achieved in the gap between the barrier walls in the area of APZ-122 and APZ-123. There also does not appear to be a recovery well installed in this area to mitigate the flow of groundwater to Morses Creek. While it is acknowledged that APZ-122 and APZ-123 are just outside of the southeastern boundary of IAOC A9 and are within the boundaries of IAOC A8, an explanation and discussion should be provided for the lack of hydraulic control in this area. It should also be noted that the table on electronic page 52 of the IAOC A9 RAR erroneously claims that the hydraulic control lines of evidence are met for APZ-122 and APZ-123 for Q4 of 2019 and Q1 of 2020. Given that the water levels in those two piezometers are higher than the adjacent surface water body elevation of Morses Creek in both cited quarters, 'No' should be listed in the table, for each of the slots highlighted in yellow below:

Hydraulic Control Lines of Evidence Evaluation Criteria	Monitoring Location	Monitoring Date			
		2020	2019		
		Q1	Q4	Q3	Q2
Inland Hydraulic Gradient Toward Recovery System and Barrier Wall	Collective Well Network	Yes	Yes	Yes	Yes
Water Levels in Recovery Wells Near Barrier Wall Gaps Below Adjacent Surface Water Elevation	RW-A9-1	Yes	Yes	Yes	Yes
	RW-A9-2	Yes	Yes	Yes	Yes
	RW-A9-3	Yes	Yes	Yes	Yes
	RW-A9-4	Yes	Yes	Yes	Yes
	RW-A9-5	Yes	Yes	Yes	Yes
	RW-A9-6	Yes	Yes	Yes	Yes
	RW-28 (GCT)	Yes	Yes	Monitoring Began Quarter 4, 2019	
	RW-29 (GCT)	Yes	Yes		
Water Levels in Piezometers Near Barrier Wall Gaps Below Adjacent Surface Water Elevation	APZ-116	Yes	Yes	Piezometers Installed October 2019	
	APZ-117	Yes	Yes		
	APZ-118	Yes	Yes		
	APZ-119	Yes	Yes		
	APZ-120	Yes	Yes		
	APZ-121	Yes	No		
	APZ-122	Yes	Yes		
	APZ-123	Yes	Yes		
Hydraulic Gradient Towards Interior of Recovery Trench at East End of No. 2 Dam Barrier Wall	DAM2-MW-1 and DAM2-MW-2	Yes	Yes	Yes	Yes
Total System Flow Rate Meets or Exceeds Design Flow Rate	System Totalizer	Yes		Yes	

6. *Figure 4, IAOC A9 Details,* shows several areas of the A9 Subsurface Barrier Wall and GBT/ GCT Subsurface Barrier Wall that do not appear to be connected. Please justify these discontinuities and how this is protective of the surface waters from being contaminated further.

   Additionally, hydraulic control has not been demonstrated for the area near the No. 2 Dam Interceptor Trench (APZ-122 and APZ-123). Therefore, the Department asserts this remedial action may not be protective, pursuant to N.J.A.C. 7:26E-5.1. As such, the Department does not concur that a "semiannual surface water inspection for the downstream side of the No.2 Dam" is adequately protecting the surface water receptors (Morses Creek and Peach Orchard Brook). Additional justification for the protectiveness of this remedy is required.

7. The ESNRs, Morses Creek and Peach Orchard Creek are required to be investigated, as there is evidence of a potential discharge of EPH product into these surface waters, pursuant to N.J.A.C. 7:26E-1.16, 3.6, and 4.8. The timeline in the report states the following event occurred: *"August 2015: Turbidity barrier and oil booms were installed in the Peach Orchard Creek Reservoir between August 4-5, 2015."* It is understood that Morses Creek will be addressed as an individual IAOC, but clarification is needed on whether Peach Orchard Creek will also be addressed as its own IAOC or a part of another investigation at the BRC.

   At this time, the Department requests ExxonMobil to submit under separate cover Remedial Action Workplan(s) (RAWs) to conduct Interim Remedial Measures (IRMs) of free product and/or separate phase material in surface water bodies, including but not limited to, Morses Creek and Peach Orchard Creek.

8. Cap A9-8 was installed based on the historical soil analytical results for GMW-120. Given the exceedances of TPH, arsenic, benzo(a)anthracene, and benzo(a)pyrene concentrations, it is unclear why this was not treated as a hot spot and removed. Particularly since surgical excavation of arsenic-contaminated soils was the only removal remedial action for this IAOC.

   Noteworthy, the narrative in Section 6.4 regarding this capped area, Cap A9-8, omits the fact that GMW-120 is not delineated in the NW direction (which is out of the boundaries of IAOC A9) at a concentration of 35,300 mg/kg from 0-2 ft. This exceeds the presumed default product limit of 17,000 mg/kg, the TPH remediation criterion of 10,000 mg/kg, and the current ceiling limit of 30,000 mg/kg EPH. As such, it is also unclear as to whether or not the cap sufficiently encompasses the extent of the contamination. Justification and clarification are needed.

Nothing in this correspondence affects your potential liability and obligations to the State Trustee, the Department, or its Commissioner regarding natural resource injuries, restoration, or damages.

Thank you for your cooperation in this matter. If you have any questions, call Charles Zielinski at (609)292-0848, or email at Charles.Zielinski@dep.nj.gov.

Sincerely,

Charles Zielinski
Bureau of Case Management

cc: Charles Zielinski, NJDEP
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